Name: Date:
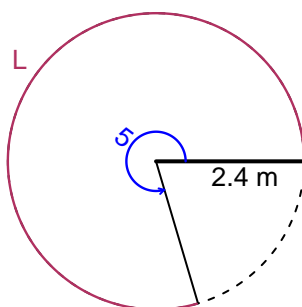
Trig Final (SLTN v669)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 5 radians. The radius is 2.4 meters. How long is the arc in meters?
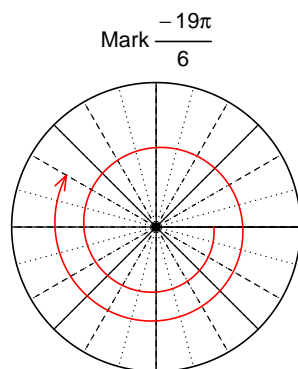

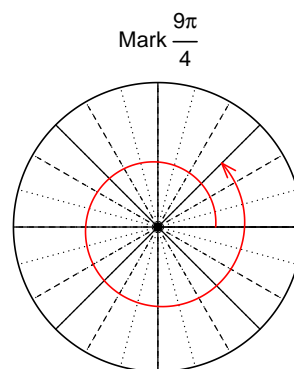$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

$L = 12$ meters.

Question 2

Consider angles $\frac{-19\pi}{6}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-19\pi}{6}\right)$ and $\cos\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-19\pi}{6}$

Find sin($-19\pi/6$)

Mark $\dfrac{9\pi}{4}$

Find cos($9\pi/4$)

$\sin(-19\pi/6) = \frac{1}{2}$
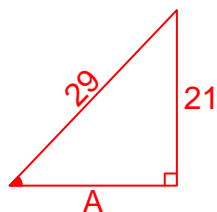
$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{21}{29}$, and θ is in quadrant II, determine an exact value for $\tan(\theta)$.
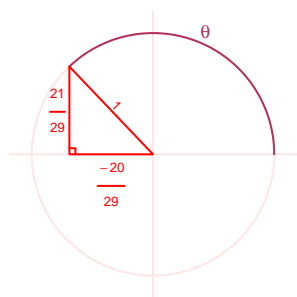
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$A^2 + 21^2 = 29^2$$
$$A = \sqrt{29^2 - 21^2}$$
$$A = 20$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.

$$\tan(\theta) = \frac{\frac{21}{29}}{\frac{-20}{29}} = \frac{-21}{20}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.97 Hz, an amplitude of 6.24 meters, and a midline at $y = -2.69$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.24 \cos(2\pi 3.97t) - 2.69$$

or

$$y = 6.24 \cos(7.94\pi t) - 2.69$$

or

$$y = 6.24 \cos(24.94t) - 2.69$$